Department of
Environmental Protection
Bureau of Land & Water Quality Feb. 2002

O&M Newsletter

A monthly newsletter for wastewater discharge licensees, treatment facility operators and associated persons

Energy Conservation in Wastewater Treatment Facilities

A wastewater treatment facility is often the most expensive capital structure in a city or town. Although funding from the Federal and State governments may have paid most of the cost of the original treatment facility, the ongoing operation and maintenance (O&M) of the facility is always paid for by the users of the system or by the local government. Energy is often one of the largest single line items in the operating budget for a wastewater treatment facility, sometimes exceeding 10% of the overall O&M budget.

Electricity is almost always the major energy expense at a treatment facility. Pumping and aeration often account for more than 75% of the total facility energy budget. This is not surprising, since that pumps and aeration equipment operate almost all the time. Other important electrical users are sludge dewatering equipment, building heat (if electric) and motors running equipment like sludge scrapers. You can't stop using this equipment without compromising the level of treatment, but there are things you can do to lower your energy use and the cost of energy at your facility.

It has been said that "energy conservation means being too cold in the winter and too warm in the summer." The term energy conservation, as used here, means an increase in energy efficiency... doing the same work with less energy. Diffused air aeration systems deliver oxygen to treatment tanks more efficiently then mechanical aerators but mechanical aerators are more efficient mixers. Many times a combination of diffused aeration and mechanical mixing can be the most efficient way to aerate and mix the treatment tanks. This type of energy conservation allows the operator to run the system more efficiently, with the added benefit of having better control over the Treatment process.

Pumps are often over-designed, especially if work has been done on the sewer system to decrease the infiltration/inflow into the system. Variable Frequency Drives (VFD's) can often be added to pump systems to allow the operator to slow the pumping rate to better match the actual influent flows. Sometimes, VFD's alone cannot do the job because the existing pump/motor combinations are too large and cannot be throttled down beyond a certain point. New pumps and motors are expensive, but part of the cost can often be paid back through energy savings that come from smaller, more efficient pumps and motors controlled by VFD's.

The first step in finding out if there are places in your treatment facility where energy can be saved is to have an energy audit done. Utility companies offer energy

audit services and many engineering companies also provide these services. An energy audit can be a simple walk-through of your plant where the auditor points out obvious places where energy is being wasted. A more rigorous audit usually involves testing the equipment in the plant to find out how much electric power is being used and how often the equipment operates. The auditor also looks at the condition and nameplate ratings of each motor to determine the rated efficiency of the motor. Comparing the nameplate and actual efficiency of motors can often point out equipment where replacement will save a great deal of money over time. If you decide to have an audit done by an outside auditor, you would be wise to choose a firm who has personnel who have experience doing energy audits on wastewater treatment facilities.

There are books and pamphlets available to help you do some of the steps necessary for an energy audit. Some of these are listed at the end of this article. There is also a very good computer program that can help you determine the energy efficiency of all the pumps in you facility. You can get on the internet as a free download at http://public.ornl.gov/psat/. You can ge a similar computer program to help determine the efficiency of any electric motor from http://mm3.energy.wsu.edu/mmplus/default.stm. One of the things you should do to prepare for an energy audit is to collect your electric bills for at least one year and, preferably two to three years. This will help both you and the auditor understand how you use energy at your facility.

While your electric utility may provide some energy audit services for free, you will have to pay for an audit done by a private company. Many of the energy saving improvements recommended in an audit will also cost money. If a conservation measure will pay back the cost of the measure within one year, is can usually be funded through the plant's O&M budget. You may need a source of additional funds to pay for energy conservation measures that take more than one year to pay back the initial investment. The State Revolving Fund (SRF) can be a source of money to pay for both energy audits and the energy conservation measures such audits recommend.
The SRF provides low interest loans to municipalities and quasi-municipal corporations such as sanitary districts for construction of and capital improvements to wastewater treatment plants and associated facilities. The SRF is funded by a combination of federal capitalization grant and state bond issue funds equal to 20% of the federal grant. State bond issues are approved by the voters in the State of Maine. The Maine Municipal Bond Bank (MMBB) and the DEP manage the SRF program. Interest rates are 2% below the market rate. While money from the SRF is a loan and not a grant, the payback from most energy conservation projects will help make the loan payments and, when the loan is fully paid off, the energy savings will continue to reduce costs for the municipality or district.

References:

Energy Management Training Seminar for the Wastewater Treatment Industry, Central Maine Power Company, 1990

Energy Management & Technical Information Seminar for the Wastewater Treatment Industry, Central Maine Power Company, 1995

Energy Management in New England Wastewater Treatment Plants: A Practical Guide, Metcalf & Eddy, 1993

Energy Conservation in Municipal Wastewater Treatment, U.S. E.P.A. (EPA 430/9-77-011), 1997

Some Internet of Interest:

http://www.eia.doe.gov/emeu/efficiency/contents.html

http://www.eia.doe.gov/emeu/efficiency/energy_savings.htm

http://www.oit.doe.gov/bestpractices/motors

This web site has links to the PSAT download site and to a similar site where you can download a program to help analyze the efficiency of electric motors.

http://www.epa.gov/region1/steward/neeat/muni/moreinfo.html

This last site has a link to a report about a study of energy efficiency and alternate energy options at several wastewater treatment facilities in New England.

This is the first in a series of articles on energy issues that will be published in the O&M News in the upcoming months.

CALCULATING MONTHLY FLOW AVERAGE

When you discharge intermittently, do you remember to calculate the monthly average by the using the actual number of discharge days, rather than automatically dividing by 30? "Average Monthly Discharge Limitations" are defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during that month divided by the number of days on which discharges occurred.

For facilities that discharge intermittently in a given month, such as treatment lagoons and industries that may not discharge on weekends, the monthly average calculations should be based on actual discharge days in the reporting month, not calendar days.

For example, a facility discharges for 24 days in November, and the total volume discharged during those 24 days is 4.32 million gallons. The monthly average discharge is 4.32 million gallons divided by 24 days, or 0.18 MGD.

Operators should begin doing flow average calculations in this manner, if they have not been doing so in the past. (NOTE: If you have been using another method of calculating averages, please make note of the differences in calculation methods for your files and inform your DEP inspector as well.)

Carolyn Bergeron

Electronic Copies of the O&M news

If you have e-mail and would like to receive the O&M News electronically instead of in the mail, please send an e-mail to:

dick.darling@state.me.us

We will add your e-mail address to our e-mail group and start sending your O&M News electronically.

We'll still continue to post every issue of the O&M news on the DEP Web site at http://www.state.me.us/dep/blwq/newslet/omnews.pdf

Waste Discharge License/Maine Pollutant Discharge Elimination System Backlog Status Report

General Overview

In November of 1999, the Maine Department of Environmental Protection's Division of Water Resource Regulation established a goal to reduce the backlog of expired State Waste Discharge Licenses (WDLs) by 95% by December 31, 2002. On January 7, 2000, a three-year schedule was established for renewing licenses to meet that goal. The schedule was revised on October 1, 2001, whereby the deadline for the goal was extended out to June 30, 2003.

Status Beginning Calendar Year 2001

As of January 1, 2001:

- There were a total of 375 active WDLs for discharges from POTWs and industrial/commercial facilities.
- Backlog of expired licenses = 105 ⇒ 41 POTW's & 64 non-POTW's (28% of total)

- Expirations during YR 2001 = 57 ⇒ 25 POTW's & 32 non-POTW's (15% of total).

- **Projected backlog as of 12/31/2001 = 105 + 57 = 162 (43% of total).**

Calendar Year 2001 Licensing/Permitting Actions

During calendar year 2001, a total of 77 licensing/permitting actions were taken. These licensing/permitting actions break down as follows:

Active licenses/permits renewed = 59 ⇒ 22 majors & 37 minors
Active licenses/permits modified = 14 ⇒ 9 majors & 5 minors
New licenses issued = 2 ⇒ Both minors
Inactive licenses retired = 2⇒ Both minors
TOTAL ACTIONS = 77

The total of 77 licensing/permitting actions represents 83% of the 93 licensing/permitting actions originally scheduled for YR 2001. **Our YR 2001 licensing actions cut the year-end projected backlog almost in half, from 43% to 23% of all active licenses.** The original schedule could not be met due to issues associated with the transition from a State WDL program to State MEPDES program. The three new license/permit writers hired to administer the MEPDES program are now largely up-to-speed. This should result in greater productivity during the coming years. All licenses/permits originally scheduled for renewal but not completed during YR 2001 (17) have been re-assigned to YR 2002. It is noted that 12 – 301(h)(primary treatment) permits have been draft and sent to EPA Region I for joint public notice and issuance and are scheduled for issuance in the first calendar quarter of 2002.

Status Beginning Calendar Year 2002

As of January 1, 2002:

- There will be a total of 375 active WDL's/MEPDES permits for discharges from POTW's and industrial/commercial facilities.

- Backlog of expired licenses = 86 + 17 carried over from 2001 = 103 (27% of total).

- Expirations during YR 2001 = 36 (10% of total).

- **Projected backlog as of 12/31/2002 = 103 + 36 = 139 (37% of total).**

Calendar Year 2002 Licensing Actions

A schedule has been established to issue 137 WDL's/MEPDES permits (24 majors & 113 minors) during calendar year 2002. This includes 17 licensing/permitting actions carried over from YR 2001.

Assuming a success rate of 82% (equal to that achieved during 2001), **our YR 2002 licensing/permitting actions will cut the year-end projected backlog from 37% to 7% of all active licenses.** It is noted this does not include a possible 40 aqua-culture general or individual permitting actions.

Please contact Gregg Wood at 287-7693 or gregg.wood@state.me.us if you have questions or need additional information regarding this matter.

Gregg Wood

For Practice

1. The jar test is used to determine the proper dosage for which chemical?
   a. chlorine for disinfection
   b. activated carbon for absorption of organic chemicals
   c. polymer for sludge coagulation.
   d. lime for pH control.

2. Which of the following is most resistant to disinfection?
   a. Fecal Coliform
   b. Salmonella
   c. Protozoa
   d. Spores

3. An operator who normally wastes 1500 gallons of sludge with a concentration of 3% is now able to pump sludge with a 5% concentration. How many gallons should be pumped to remove the same amount of sludge solids?
   a. 600 gallons
   b. 900 gallons
   c. 1200 gallons
   d. 1500 gallons

4. You notice a sour, septic odor coming from your secondary clarifiers and when you examine the return sludge, it is black. What would you do to fix this problem?
   a. increase the number of times the clarifiers are cleaned.
   b. reduce the return rate to prevent septic sludge from harming the aeration basins.
   c. increase the return rate to reduce the sludge detention time in the clarifiers.
   d. do nothing; this is a normal operating condition.

UPCOMING TRAINING COURSES

February 5, 12, 26 & March 5, 2002 in Norway, ME – NPDES Laboratory Class - Control - sponsored by MRWA, (207) 729-6569 - Approved for 16 hours.
*****

February 12, 2002 in Augusta, ME - Water Bureau Issues Briefing - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

February 19, 2002 in Portland, ME - Safety Awareness Program - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

February 21, 2002 in Portland, ME - Advanced On Site Septic System Installation - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

February 28, 2002 in Topsham, ME – Practical Chemistry for Operators - sponsored by MRWA, (207) 729-6569 - Approved for 4 hours.
*****

March 5, 2002 in Bangor, ME - Hands-On Review of BOD, TSS & Seeded BOD - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

March 7, 2002 in Mexico, ME – Excavation & Permit Required Confined Spaces - sponsored by MRWA, (207) 729-6569 - Approved for 5 hours.
*****

March 11, 2002 in Presque Isle, ME – Practical Chemistry for Operators - sponsored by MRWA, (207) 729-6569 - Approved for 4 hours.
*****

March 12, 2002 in Portland, ME - Hands-On Review of Pump Basics - sponsored by JETCC (207) 767-2649
*****

March 13, 2002 in Hallowell, ME – Excavation & Permit Required Confined Spaces - sponsored by MRWA, (207) 729-6569 - Approved for 5 hours.
*****

March 14,21,28 & April 4 in Scarborough, ME - Advanced Hydrology & Special Topics(4-week course) - sponsored by JETCC (207) 767-2649 - Approved for 16 hours.
*****

March 19, 2002 in Waterville, ME - Use of Polymers in the WWTP - sponsored by JETCC (207) 767-2649
*****

March 19, 2002 in Vassalboro, ME - Use of Coagulants & Flocculants in Water Applications - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

March 20, 2002 in South Berwick, ME – Excavation & Permit Required Confined Spaces - sponsored by MRWA, (207) 729-6569 - Approved for 5 hours.
*****

March 21, 2002 in Rockland, ME - Pretreatment Septic System Installation - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

March 26, 2002 in Brewer, ME - Basic On Site Septic System Installation - sponsored by JETCC (207) 767-2649 6569 - Approved for 6 hours.
*****

March 27, 2002 in Presque Isle, ME - Advanced On-Site Septic System Installation - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****

March 27, 2002 in Calais, ME – Excavation & Permit Required Confined Spaces - sponsored by MRWA, (207) 729-6569 - Approved for 5 hours.
*****

March 28, 2002 in Augusta, ME - Applying Process Control Tests to WWTP - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****
April 9, 2002 in Kennebunkport, ME - By-Pass Pumping WWTP - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
April 10, 2002 in Skowhegan, ME – Respiratory Protection - sponsored by MRWA, (207) 729-6569 - Approved for 3.5 hours.
*****
April 10, 2002 in Scarborough, ME – HydroCad - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****
April 16, 2002 in Presque Isle, ME - Basic Microscopy for Wastewater Operators & Using ORP for Process Monitoring WWTP - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****
April 17, 2002 in Brewer, ME - Basic Microscopy for Wastewater Operators & Using ORP for Process Monitoring WWTP - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****
April 17, 2002 in Portsmouth, NH – Optimizing SBR Operation - sponsored by NEIETC (978) 323-7929 - Approved for 6 hours.
*****
April 17, 2002 in South Berwick, ME – Respiratory Protection - sponsored by MRWA, (207) 729-6569 - Approved for 3.5 hours.
*****
April 18, 2002 in Brunswick, ME - Basic Microscopy for Wastewater Operators & Using ORP for Process Monitoring WWTP - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****
April 24, 2002 in Bangor, ME – Respiratory Protection - sponsored by MRWA, (207) 729-6569 - Approved for 3.5 hours.
*****
May 1, 2002 in Livermore Falls, ME - Advanced Computer Spreadsheets for Wastewater Operators - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.
*****
May 7, 2002 in Thomaston, ME Mechanical Packing & Mechanical Seals - sponsored by JETCC (207) 767-2649 - Approved for 6 hours.

Answers to *For Practice:*

1. c Jar tests are typically used to determine the optimum dose of a polymer or other coagulant for sludge conditioning or removal of a metal.
2. d Some bacteria and protozoa can form spores or cysts that can resist disinfection by chlorine. *Giardia* and *Criptosporidium* are examples of pathogenic protozoa that form cysts that are nor usually killed by chlorine disinfection and can cause human health problems.
3. b The total sludge wasted at 3% concentration is: 1500 gal $\times$ 0.03 $\times$ 8.34lb/gal = 375.3 lbs.
   To waste 375.3 pounds of sludge at 5% concentration, the number of gallons is calculated as:
   375.3 lbs. $\div$ (0.05 $\times$ 8.34 lb./gal) = 900 gallons.
   This can be simplified as: [1500 $\times$ 0.03 $\times$ ~~8.34~~] $\div$ [0.05 $\times$ ~~8.34~~] = 900 gallons
4. c The sour, septic odor means that the sludge is becoming anaerobic because it is sitting too long in the clarifiers. Increasing the return rate will move the sludge back to the

aerobic conditions in the aeration tanks and help prevent the septic conditions from happening in the clarifiers

WEF Announces Wastewater Infrastructure Security Workshop Series

Concern that water and wastewater infrastructure in the United States (US) could be vulnerable to terrorist attack - biological, chemical, and structural - has understandably been heightened by recent events. Relief from this concern can come via knowledge, planning, and preparedness. The Water Environment Federation (WEF) and its member associations are collaborating with other organizations and with government agencies to provide utilities and professionals with tools and information to ensure effective planning and preparedness.

WEF is now pleased to announce the latest resource - a series of US EPA-sponsored training workshops to be held at locations throughout the country during March - May 2002. Developed for wastewater utility managers, these one-day workshops will address critical areas of concern including how to mitigate security threats and how to react in the event of a crisis.

Today's utility managers need to be concerned with the prevention of service interruptions and the protection of infrastructure assets from a wide range of threats. These could range from nuisance vandalism to crisis events triggered by terrorism or natural disasters. The principles covered in the workshops will assist utility professionals prepare to comprehensively assess and prioritize utility asset vulnerabilities, including to the physical plant, knowledge base, employees, information technology and customers. The training format will include presentations on vulnerability assessment approaches, interactive exercises, and case studies/input from utility managers that have conducted or are planning a vulnerability assessment.

Attendees will receive a notebook containing:

- Speaker presentation materials;
- Association of Metropolitan Sewerage Agencies' new publication "Asset Based Vulnerability Checklist for Wastewater Utilities";
- Relevant EPA fact sheets and guidance materials;
- Background on accessing information from other sources.

Registration is now open for the first workshop in this series, to be held ***March 6, 2002***, at the Marriott, Copley Place, in Boston. The registration form is reprinted in this *O&M News.*

Dick Darling

Spring 2002 Exam

The Spring 2002 Wastewater Operator Certification Exam will be given Wednesday, May 15, 2002 in the usual locations, South Portland, Bangor and Presque Isle. Application ***must*** be postmarked on or before Saturday, March 30, 2002 or delivered to our offices by Monday, April 1, 2002.

Applications can be obtained by contacting Leslie Rucker at 287-9031 or by writing to: Wastewater Operator Certification Program, Maine Department of Environmental Protection,
17 State House Station, Augusta, ME 04333-0017.

Water Environment Federation®
Preserving & Enhancing the Global Water Environment

EPA

Wastewater Infrastructure Security Training Workshop

Boston Marriott Copley Place ■ Boston, Massachusetts, USA
March 6, 2002 ■ 8:30 am to 5:00 pm

WEF Membership Number (if applicable) _____

First Name _____ Middle Initial _____ Last Name _____

Company or Organization _____

Mailing Address _____

City _____ State/Province _____ Zip/Postal Code _____ Country _____

Telephone Number _____ FAX Number _____ E-mail Address _____

Social Security Number (for identification purposes) _____

Signature (for identification purposes) _____

HOW TO REGISTER

Due to time limitations, we will be accepting registration forms by fax only. Please send registration form by FAX: 1-703-684-2413 or 1-703-684-2492

Registration Information

Registration is free and open to WEF members and non-members, but is limited to 150 people. All registration forms received by March 1 will receive confirmation by email or fax. Please do not make travel arrangements until your registration is confirmed. WEF is not responsible for any travel arrangements or costs.

Please register as early as possible, but no later than March 1, 2002. Priority will be given to representatives of utilities. To allow maximum participation, WEF may limit the number of representatives from each organization.

Registrants will receive one-day training, speaker materials, lunch and refreshment breaks.

Please bring government-issued picture identification with you to the workshop, as we will be checking it at registration. The name on the registration must match the name on the identification.

For questions or more information, please call WEF at 1-703-684-2400 extension 7090, or email to securityreg@wef.org.

Hotel Information

Boston Marriott Copley Place Hotel
110 Huntington Avenue
Boston, MA 02116

Reservations: 1-800-228-9290 or 1-617-236-5800

WEF has blocked a minimum number of hotel rooms at a special rate of $179 per night through February 19 or until the block sells out. WEF cannot guarantee the conference rate after that date.

Participants should make hotel arrangements directly with the Marriott. Please call the hotel or visit their website for more information or directions.
Hotel Phone: 1-617-236-5800
Guest Fax: 1-617-236-5885
Website: www.marriott.com/marriott/bosco

For more information, visit: http://www.wef.org/